PROJECT FACT SHEET

CONTRACT TITLE: Predictability of Formation Damage - An Assessment Study and Generalized Models

DATE REVIEWED: 01/13/93 **DATE REVISED:** 07/01/92

OBJECTIVE: The principal focus of this research is to critically evaluate, classify, and document the studies reported in the literature on formation damage techniques, improve on the existing methods, and develop a comprehensive methodology based on sound engineering principles. This project will develop a predictive model that relates reservoir characteristics such as migrating fines and swelling clays to wellbore measurements.

ID NUMBER: DE-AC22-90BC14658

B & R CODE: AC1510100

CONTRACT PERFORMANCE PERIOD:
04/05/90 to 10/04/92
PROGRAM: Lt Oil
RESEARCH AREA:

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SCHEDULED MILESTONES:

Literature survey of existing models and data	04/91
Annual report of research progress	11/90
Evaluate models against experimental data	02/91
Final report.	04/92

FUNDING (1000'S)	DOE	OTHER	CONTRACTOR	TOTAL
PRIOR FISCAL YRS	193	0	35	**228**
FISCAL YR 1993	0	0	0	**0**
FUTURE FUNDS	0	0	0	**0**
TOTAL EST'D FUNDS	**193**	**0**	**35**	**228**

PROJECT DESCRIPTION: Experimental and theoretical studies of formation damage reported in the literature and new experimental data have been incorporated in advanced models of formation damage.

Research have been conducted on aspects critical to the models being developed:
1) chemical composition of rock relative to adsorption, dissolution and swelling,
2) electrical and adsorptive properties and wettability of the pore surface,
3) behavior of the fluid phase,
4) kinetic parameters of rate processes in porous media,
5) numerical models of thermodynamic and transport processes related to rock/fluid interactions, and
6) development of computer subroutines for efficient calculation of chemical phenomena.

The developed models are being verified using case histories. Finally, computer programs will be presented in a user-friendly format.

PRESENT STATUS: The project is nearing completion.

ACCOMPLISHMENTS: Project has been progressing on schedule.

The publications/presentations/reports resulting from the project are:
1. "Modeling Formation Damage by Dissolution/Precipitation Processes."
2. "Modeling of Formation Damage Due to Physical and Chemical Interactions Between Fluids and Reservoir Rocks."
3. "Predictability of Formation Damage by Modeling Chemical and Mechanical Processes."
4. "Evaluation and Comparison of the Formation Damage Models."
5. "Mud Fluid Invasion Damage Resulting from Drilling of Wells into In-Situ Mineral and Fossil Fluid Resources."
6. "Effect of Residual Oil on Water Sensitivity of Sandstones."
7. "Modeling of Formation Damage Due to Physical and Chemical Interactions Between Fluids and Reservoir Formation."
8. "A Multi-Phase Mid Fluid Infiltration and Well Bore Filter Cake Formation Model."
9. Final report is being prepared and will be submitted in October 1992.

BACKGROUND: Understanding and controlling formation damage or skin effect is generally predicted and evaluated by correlations based on experimental results, which are poorly correlated to actual reservoir conditions. This results in unreliable information being used for design of completion treatments of wells. This study will assess the existing correlations and develop improved models and correlations. The experimental parts of this study will emphasize realistic reservoir conditions. The resulting predictive models can be incorporated in reservoir simulators.